CLAIMS:

1. A method of forming a metal oxide film having a gas-barrier property on a surface of a predetermined substrate by reacting an organometal with an oxidizing gas by the plasma CVD method, wherein a reaction between organometals is chiefly carried out by the glow discharge in a low-output region and, then, organometals are reacted with the oxidizing gas by the glow discharge in a high-output region.

2. A method of forming a metal oxide film according to claim 1, wherein said glow discharge is carried out in a microwave electric field.

3. A method of forming a metal oxide film according to claim 2, wherein said low-output region is in a range of 20 to 90 watts, and said high-output region is in a range of not lower than 100 watts.

4. A method of forming a metal oxide film according to claim 3, wherein the output is continuously changed from said low-output region up to said high-output region.

5. A method of forming a metal oxide film according to claim 3, wherein the output is changed stepwise from said low-output region up to said high-output region.

6. A method of forming a metal oxide film according to claim 2, wherein the output is changed from said low-output region to said high-output region, which is, then, followed by the repetition of a change of output from the high-output region to the low-output region and a change of output from the low-output region to the high-output region.

7. A method of forming a metal oxide film according to claim 1, wherein an organosilicon compound is used as said organometal.

8. A method of forming a metal oxide film according to claim 1, wherein a plastic material is used as said substrate.

9. A method of forming a metal oxide film according to claim 7, wherein an organic layer is formed maintaining a thickness of not larger than 10 nm on the surface of the substrate by the microwave glow discharge in the low-output region, said organic layer being rich in carbon and having a carbon concentration of not smaller than 15% on the basis of three elements of O, C and Si.

10. A method of forming a metal oxide film according to claim 9, wherein a metal oxide film is formed having a total thickness of not larger than 100 nm.

11. A method of forming a metal oxide film according to claim 2, wherein said microwaves are intermittently oscillated.

12. A method of forming a metal oxide film according to claim 11, wherein the output waveform of said microwaves is changed by changing a maximum output and an oscillation time.

13. A method of forming a metal oxide film according to claim 11, wherein the output waveform of the microwaves in the low-output region is different from the output waveform of the microwaves in the high-output region.

14. A method of forming a metal oxide film according to claim 13, wherein the output waveform of the microwaves in the low-output region is such that the oscillation time of microwaves in one period is not longer than 1.5 milliseconds.

15. A method of forming a metal oxide film according to claim 13, wherein the output waveform of the microwaves in the high-output region is such that

the oscillation time of microwaves in one period is not shorter than 2 milliseconds.

16. A method of forming a metal oxide film according to claim 11, wherein the stop time of the microwaves in one period is 2 milliseconds to 30 milliseconds.

17. A microwave power source device for driving a microwave-generating unit by applying a voltage, comprising:

a voltage-adjusting circuit for determining a peak output in said applied voltage;

an ON time-adjusting circuit for determining an ON time of said applied voltage; and

an applied voltage control circuit for forming waveforms of said applied voltage based on said peak output from said voltage-adjusting circuit and/or on said ON time from said ON time-adjusting circuit.

18. A microwave power source device according to claim 17, wherein said applied voltage control circuit includes:

an inverter circuit unit for forming said applied voltage into a pulse waveform of a high frequency; and

an inverter drive circuit unit for driving said inverter circuit unit based on said peak output from said voltage adjusting circuit and/or said ON time from said ON time adjusting circuit.

19. A microwave power source device according to claim 18, wherein:

said inverter circuit unit includes a switching element for forming said applied voltage to have a high frequency; and

said inverter drive circuit unit includes:

a setpoint variable control unit for forming a control signal representing an adjusted value of said peak output and/or said ON time based on said

peak output from said voltage adjusting circuit and/or said ON time from said ON time adjusting circuit; and

a switching element drive unit for driving said switching element in said inverter circuit unit based on said control signal.

20. A microwave power source device for driving a microwave-generating unit by applying a voltage, comprising:

a voltage-adjusting circuit for determining a peak output in said applied voltage;

an ON time-adjusting circuit for determining an ON time of said applied voltage based on said peak output in said applied voltage determined by said voltage-adjusting circuit; and

an applied voltage control circuit for forming waveforms of said applied voltage based on said ON time from said ON time-adjusting circuit.

21. A microwave power source device according to claim 20, wherein said voltage adjusting circuit has a transformer and/or a slidac for adjusting the peak output of said applied voltage.

22. A microwave power source device according to claim 20, wherein:

said ON time adjusting circuit includes an ON time adjusting unit for adjusting the ON time of said applied voltage based on said peak output in said applied voltage determined by said voltage adjusting circuit, and a trigger generator unit for determining the timing for generating a trigger based on the ON time from said ON time adjusting unit; and

said applied voltage control circuit includes a phase control unit for controlling the phase of said applied voltage based on the timing for generating the trigger.

23. A microwave power source device according to claim 22, further comprising a feedback unit for receiving said applied voltage applied to said microwave generator unit as a feedback voltage, wherein said ON time adjusting unit in said ON time adjusting circuit adjusts said ON time based on said feedback voltage from said feedback unit.

24. A microwave power source device according to claim 22, wherein said ON time adjusting circuit has an output setting unit for setting a voltage value of said applied voltage, and said ON time adjusting unit adjusts said ON time based on said voltage value from said output setting unit.

25. A microwave power source device according to claim 22, wherein said trigger generator unit includes a pulse transformer for generating said triggers, and said ON time adjusting unit includes a diode bridge for determining said ON time based on said feedback voltage from said feedback unit and/or on said voltage value from said output setting unit, and further includes a capacitor that gives a predetermined voltage value to said trigger generating unit.

26. A microwave power source device according to claim 22, wherein said phase control unit has a triac for controlling the phase of said applied voltage based on said trigger signal.